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power and grace with which he could paint in spoken or written words, the aspects and moods of that world of nature, great and small, in field and forest, that he so dearly loved and enjoyed with all the sincerity and philosophical sobriety of an Emerson. That these traits and his readiness also to offer advice and help to beginners in the fields of animal and vegetable histology (in both of which he was a deservedly recognized authority), his uniform kindness of manner, uprightness and purity of character, have endeared his memory to his fellow-members of the Academy.

Cretaceous Ammonites and other Fossils near Moorestown, N. J. Their stratigraphic position shown by an Artesian Well Section at Maple Shade, N. J. Incidental reference to Water Horizons.—LEWIS WOOLMAN stated that during the fall of 1892 there had been placed in his hands for identification by Joseph Walton of Moorestown, N. J., an interesting set of cretaceous fossils collected by him at the clay pits belonging to A. A. Reeve upon the left bank of the north branch of the Pensauken Creek, two miles very slightly south of west from Moorestown station and between Maple Shade and Lenola stations on the Burlington County R. R.

The fossils are mainly in the form of casts, and are remarkably well-preserved in comparison with similar fossils from other localities in the State.

The most noticeable among them are two species of *Ammonites* each about twelve inches in diameter, being considerably larger than any of the same species now in the Academy's collection from the State of New Jersey, though there are in the Museum two individuals of one of the forms from the Delaware and Chesapeake Canal that measure respectively 16 and 18 inches across.

The number of species collected by Joseph Walton numbered twenty-three, all mollusks except one—an *Echinus*.

More recently visits to the locality have been made by C. W. Johnson with a class from the Wagner Institute, by Prof. A. Heilprin with the Academy's Geological Class and by the speaker accompanied by Professors Smock and Salisbury.

These parties collectively obtained not only all the molluskan forms found by Joseph Walton but also forty-two additional ones mostly of the smaller forms. This makes the total number of species of mollusks sixty-four.

There were also found fish remains consisting of teeth belonging to the genus *Pycnodus*, and also undeterminable fragments of bones and portions of crab's claws together with considerable lignite. The latter was in some cases much bored by the Teredo and the cavities frequently lined with minute crystals of iron pyrites. A number of specimens of *Martesia cretacea* showing the shell were also found in burrows they had themselves made in the wood.

Through the courtesy of several members of the two classes a considerable number of the specimens they procured were submitted for examination. These together with those previously collected were carefully compared by H. A. Pilsbry and the speaker with the figures and text of Whitfield's Paleontology of New Jersey and with the works of other authorities, and also with the types and other specimens in the Museum of the Academy.

One form, *Voluta delawarensis*, was identified by Professor R. P. Whitfield. Professor A. Heilprin kindly assisted in the final determination of a few forms. In nomenclature we have followed Whitfield, to whose work the specialist is referred for synonyms and references to other literature. For convenience the volume, page, plate and figure where each is described and illustrated are noted. The list is as follows:

CEPHALOPODA.

Ammonites (*Placentaceras*) *placenta* DeKay.[1] Vol. II, page 255 pl. XL, fig. 1, XLI, figs. 1 and 2.

Ammonites delawarensis Morton. Vol. II, page 252, pl. XLII, figs. 6 to 9.

Scaphites hippocrepis DeKay. Vol. II, page 262, pl. XLIV, figs. 8 to 12.

Scaphites nodosus Owen. Vol. II, page 261, pl. XLIV, figs. 13 and 14.

Baculites ovatus Say. Vol. II, page 275, pl. XLVI, figs. 3 to 9.

GASTEROPODA.

Cerithium (*Potamides ?*) Sp. ?

Dentalium subarcuatum Conrad, internal casts. Vol. II, page 166, pl. XX, figs. 19 and 20.

Dentalium subarcuatum Conrad, external impression. Vol. II, page 166, pl. XX, figs. 21 to 24.

Alaria rostrata Gabb, (numerous). Vol. II, page 119, pl. XIV, figs. 5 and 6.

Gyrodes infracarinata Gabb. Vol. II, page 125, pl. XV, figs. 13 to 16.

Lunatia halli Gabb. Vol. II, page 130, pl. XVI, figs. 13 to 16.

Natica abyssina Morton. Vol. II, page 123, pl. XV, fig. 9 to 12.

Turbinella parva Gabb. Vol. II, page 80, pl. IX, figs. 4 to 6.

Turritella vertebroides Morton (?). Vol. II, page 146, pl. XVIII, figs. 13 to 18.

Voluta (?) *delawarensis* Gabb. Vol. II, page 84, pl. X, figs. 5 to 7.

Volutoderma abbotii Gabb. Vol. II, page 173, pl. XXI, figs. 4 to 9.

Volutomorpha—Sp. ?

Avellana bullata Morton. Vol. II, page 163, pl. XX, figs. 1 to 4.

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[1] The references are to Whitfield's Palæontology of New Jersey.

Cithara crosswickensis Whitfield. Vol. II, page 107, pl. XIII, figs. 7 and 8.

Odontofusus slacki Gabb. Vol. II, page 66, pl. VI, figs. 8 and 9.

Gyrodes obtusivolva Gabb. Vol. II, page 129, pl. XVI, figs. 9 to 12.

Gyrodes altispira Gabb. Vol. II, page 128, pl. XVI, figs. 7 and 8.

Margarita abyssina Gabb. Vol. II, page 133, pl. XVII, figs. 1 to 5.

Modulus lapidosa Whitfield. Vol. II, page 152, pl. XVII, figs. 6 to 8.

Pyropsis alabamensis Gabb.

Pyropsis naticoides Whitfield. Vol. II, page 43, pl. II, figs. 5 to 7.

Rostellites nasutus Gabb. Vol. II page 86, pl. XI, figs. 1 and 2.

Rostellites texturatus Whitfield. Vol. II, page 88, pl. XI, figs. 5 and 6.

Rostellites angulatus Whitfield. Vol. II, page 88, pl. XI, figs. 3 and 4.

Scalaria thomasi Gabb. Vol. II, page 137, pl. XVIII, fig. 1.

Scalaria sillimani Morton. Vol. II, page 138, pl. XVIII, fig. 2.

Scalaria ——— sp?

Turritella encrinoides Morton. Vol. II, page 143, pl. XVIII, figs. 19 to 22.

Turritella lippincotti Whitfield. Vol. II, page 145, pl. XVIII, figs. 23 and 24.

Turritella pumila Gabb. Vol. II, page 187, pl. XXIII, figs. 5 and 6.

Endoptygma umbilicata Tuomey. Vol. II, page 136, pl. XVII, fig. 30.

LAMELLIBRANCHIATA.

Calliste delawarensis Gabb. Vol. I, page 153, pl. XXII, figs. 8 to 10.

Cardium (*Criocardium*) *dumosum* Conrad. Vol. I, page 133, pl. XX, figs. 9 to 13.

Cardium (*Fragum*) *tenuistriatum* Whitfield (numerous). Vol. I, page 139, pl. XX, figs. 15 and 16.

Cyprimeria heilprini Whitfield. Vol. I, page 160, pl. XXII, figs. 14 and 15.

Camptonectes (*Amusium*) *burlingtonensis* Gabb. Vol. I, page 53, pl. VIII, figs. 3 to 9.

Gouldia conradi Whitfield. Vol. I, page 125, pl. XVIII, figs. 1 to 3.

Idonearca antrosa Morton. Vol. I, page 96, pl. XIII, figs. 6 to 11.

Leiopistha protexta Conrad. Vol. I, page 140, pl. XX, figs. 1 to 3.

Neithea quinquecostata Sowerby. Vol. I, page 56, pl. VIII, figs. 12 to 14.

Pinna laqueata Conrad. Vol. I, page 81, pl. XVI, figs. 1 and 2.

Pholadomya occidentalis Morton. Vol. I, page 175, pl. XXIV, figs. 1 to 3.

Plicatula urticosa Morton. Vol. I, page 61, pl. IX, figs. 1 and 2.

Tenea pinguis Conrad. Vol. I, page 163, pl. XXII, figs. 1 to 3.

Anomia tellinoides Morton. Vol. I, page 43, pl. IV, figs. 12 and 13.

Axinea mortoni Conrad. Vol. I, page 99, pl. XI, figs. 23 to 25.

Aphrodina tippana Conrad. Vol. I, page 154, pl. XXII, figs. 6 and 7.

Cyprimeria densata Conrad. Vol. I, page 157, pl. XXII, figs. 19 to 21.

Clavagella armata Morton. Vol. I, page 192, pl. XXV, fig. 24.

Exogyra costata Say. Vol. I, page 39, pl. VI, figs. 1 and 2.

Idonearca vulgaris Morton. Vol. I, page 98, pl. XIII, figs. 1 to 5.

Mytilus oblivius Whitfield. Vol. I, page 64, pl. XVII, fig. 1.

Martesia cretacea Gabb. Vol. I, page 190, pl. XXV, figs. 20 to 23.

Panopea decisa Conrad. Vol. I, page 181, pl. XXIV, figs. 5 to 8.

Trigonia mortoni Whitfield. Vol. I, p. 112, pl. XIV, figs. 5 and 6.

Teredo irregularis Gabb. Vol. I, page 191, pl. XXV, figs. 18 and 19.

Teredo tibialis Morton. Vol. I, page 201, pl. XXVI, figs. 19 to 22.

Veniella conradi Morton. Vol. I, page 144, pl. XIX, figs. 8 to 10.

Included in the total number of molluscan species as above stated, and therefore to be added to this list, are two forms of Gasteropoda pronounced by Prof. R. P. Whitfield to be new to the New Jersey fauna; one of these, in a preliminary note received, he inclines to regard as a *Volutoderma* and the other he states is probably a *Cerithium* and much resembles *C. conradi* Whitfield,[2] the type of which came from the cretaceous of Syria. These forms have been again referred to him for further detailed description.

ECHINODERMATA.

Hemiaster parastatus Morton. Morton's Cretaceous Fossils, page 77, pl. III, fig. 21.

It may here be noted that one specimen of *Ammonites delawarensis* has the outer whorls on one side broken off so as to show the inner whorl. This initial whorl is identical in sculpturing with Morton's figure of *A. vanuxemi* which was doubtless named by him either from imperfect or from young specimens. This double naming of what is really one species has been noted by other writers.

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[2] See Bulletin New York Museum of Natural History, Vol. III, No. 2, page 428, pl. IX, figs. 11 and 12.

Respecting *Dentalium subarcuatum* above listed numerous casts occur that have generally been referred to that species. Most such casts were obtained in nearly straight short fragments. Examples, however, were noted in the specimens under study that were from four to five inches long, more or less bent and irregular in some parts of their length, while quite straight in other parts. This irregularity suggests that instead of belonging to the genus *Dentalium* they may very probably represent casts made by the filling in of the borings of some worm. This idea was suggested by Professor A. Heilprin. These remarks do not, however, refer to the external impressions listed as *Dentalium* which undoubtedly belong to that genus.

Most of the fossils occur in a bed of black sand about three feet thick, interbedded between two clay beds, the lower one a thick bed of black clay somewhat micaceous, and the upper one composed of two divisions, as follows: that next the black sand, a ferruginous clay with ironstone crusts, and the one above this, a soft, yellow clay. Over these are the superficial or yellow gravels. A few fossils however are found both above and below the black sand but not in the gravels.

The yellow and the black clays are used for making bricks. The black clay has been dug into or otherwise tested at the pits to the depth of about 25 feet without getting through it. Its entire thickness has, however, been ascertained to be 44 feet from a well-boring recently made at Maple Shade, one mile west.

The relative position of the fossiliferous horizon is shown in the following section, which gives the thickness of strata as ascertained at Reeve's clay-bank, and at the well as learned from a record furnished by those interested in its boring.

Surface gravel	5 ft.	
Yellow clay..	8 ft.	13 ft.
Ferriferous clay and ironstone crust...........	4 ft.	17 ft.
Fossiliferous black sand, containing Ammonites, Scaphites, Baculites and other Mollusks...........	3 ft.	20 ft.
Black clay..	44 ft.	64 ft.
(A) Fine and coarse gray sands at the top, changing to medium and then to coarse and pebbly gravels at the bottom...........	33 ft.	97 ft.
Green sand marl....................................	6 ft.	103 ft.
(B) Fine, gray sand and coarse gravel, similar to A..	27 ft.	130 ft.
White clay..	100 ft.	230 ft.
Red clay..	10 ft.	240 ft.
Alternations of sand and clay, sometimes reddish..	20 ft.	260 ft.

(C) White sand	40 ft.	300 ft.
White sand, fine, with streaks of clay	15 ft.	315 ft.
White sand, coarse	15 ft.	330 ft.
White sand, medium coarse	20 ft.	350 ft.
White gravel, coarse	10 ft.	360 ft.
White gravel, coarser	10 ft.	370 ft.
(D) White gravel very coarse, with large pebbles and boulders	5 ft.	375 ft.

The sands and gravels marked A, B, C and D, all furnish water, and may be regarded as water horizons; that marked A being the one reached by wells dug in this neighborhood and which penetrate through the black clay.

Excepting the few feet of surface gravels which are of more recent date, it may be premised that all the beds in the section are below the lower green sand marl bed, since they are west of the outcrops of the same, as mapped by the New Jersey Geological Survey. In the report of the survey for 1868, Professor G. H. Cook describes next below the lower green sand a series of beds of "clay marls," with an estimated thickness of 277 feet, of which the upper 170 feet, he states, is composed of laminated sands and thin clay seams, and the lower 170 feet of heavy, dark clays and green sands.

These "clay marls," in turn, rest upon another group of strata, composed largely of white, yellow and red clays, termed plastic clays, and which form the base of the cretaceous as it exists in New Jersey.

These plastic clays have a thickness, as shown in the report on clays (N. J. Survey, 1868), of 347 feet. The plastic clays can be distinguished from the " clay marls " by the entire absence of green sand grains in them.

Referring to the section, it may be noticed that beneath the black clays there are 66 feet of fine and coarse sand and medium, coarse and heavy gravels, including a parting near the middle six feet thick, largely composed of green sand. The presence of the green sand would seem to class these gravels with the laminated sands and clay marls, rather than with the plastic clays. The division between these two groups therefore occurs at the depth of 130 feet. Allowing five feet for the surface gravels, we have 125 feet as the thickness at this locality of the lower or dark clay and green sand division of the group of laminated sands and " clay marls." The thickness of the overlying gravel is, however, probably greater than five feet upon the more elevated portions of this region, so that a greater depth would have to be gone through in some places to reach the yellow and black clays of the clay marl series.

Remarks on Hawaiian Crania.—DR. C. N. PEIRCE remarked that Dr. I. M. Whitney of Honolulu, S. I., to whom the Academy is indebted for the collection of crania presented this evening, had informed him that the ancient Hawaiians had two quite distinct